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DIVISION 7

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SCIENTIFIC COMPANY

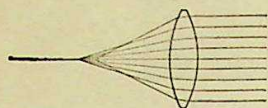
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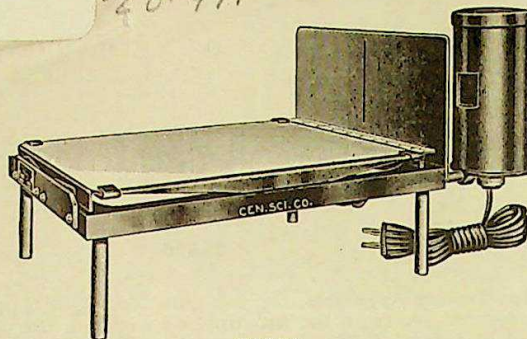
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LIGHT
Ray Tracing Apparatus

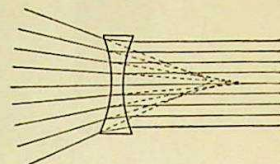
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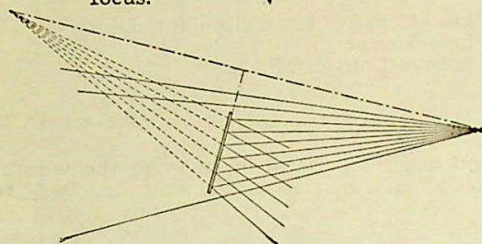
Trace of parallel rays through a converging lens showing principle focus.



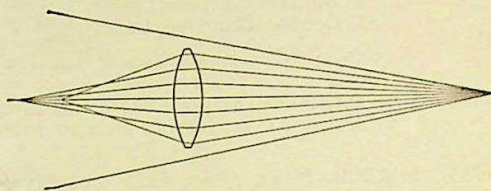
85331



Trace of parallel rays through a diverging lens showing virtual focus.



Trace of reflection of diverging rays from plane mirror, showing image of a point.



Trace of diverging rays through converging lens, showing image formation.

85331 RAY TRACING APPARATUS, Cenco-Minor, for experimental study by the individual student of the phenomena of reflection and refraction of light. The student charts the paths of a narrow beam of light on a sheet of notebook paper placed on the platen of the apparatus, striking a mirror, prism, or lens at various points on the reflecting or refracting surface, and from the lines designating the paths makes his computations.

The apparatus consists of a heavy metal support on four white-plated legs, a movable metal platen with engraved millimeter scale, a light shield with narrow vertical slit and a light source enclosed within a metal housing. The platen is provided with spring clips for securely holding a sheet of notebook paper of the standard $8\frac{1}{2}$ by 11-inch size. The engraved millimeter scale is mounted on the end of the platen nearest the light screen, to aid the student in uniformly spacing his traces. It is numbered in centimeters both ways from a center zero. The platen is easily shifted to the right or left of the slit and is firmly held in the desired position by strip springs on the support frame. The light shield with single slit is easily detached from its support by loosening two knurled thumb screws. No. 85332 Diverging Ray Attachment is interchangeable with the single-slit light shield. The light source is attached to the apparatus by a metal arm, which is adjustable for distance and angle of the lamp relative to the light shield. Line-source illumination is secured from a special vertical coil-filament incandescent lamp, which attaches to the standard medium-screw base socket by means of an adapter. It operates directly from the usual 115-volt service line.

In use, either No. 85334 Lenses and Mirrors or the corresponding optics of No. 85245 Hartl Optical Disk may be studied with the apparatus. The lens, mirror or prism is placed upon a sheet of paper clipped to the platen and its outline drawn by running a pencil along the reflecting or refracting surfaces. The light and platen are adjusted relative to each other to produce a ray of light on the platen perpendicular to the millimeter scale. The ray, before and after reflection and refraction, is located by pencil dots on the paper, which are later connected by straight lines. The platen is then shifted 5 or 10 mm, as shown by the scale, and the next position of the ray located. This may be repeated for any desired number of rays. The process is so simple that the average student may easily plot from 5 to 10 sets of ray systems in a single laboratory period. Diverging incident rays may be similarly plotted through the use of No. 85332 Diverging Ray Attachment. For experiments using this apparatus, see Experiments 4, 5, and 11, Laboratory Exercises in Geometrical and Physical Optics by Ralph S. Minor and Harvey E. White.

Complete with straight filament lamp for 115 volts, but **without** diverging ray attachment or optical parts Each \$22.00

85332 Diverging Ray Attachment, Cenco-Minor, for use with No. 85330 Ray-Tracing Apparatus, for tracing divergent incident rays. This makes possible, for example, the experimental study of conjugate foci, and direct application of the lens and mirror formulas to the results, also the experimental study of image formation. The simplicity of the attachment highly commends it. The Diverging Ray Attachment is an additional light shield, interchangeable with the one regularly supplied with the Ray-Tracing Apparatus; but instead of containing a single narrow slit, it contains nine such slits, all parallel and centrally located. This produces nine narrow beams, all coming from the single filament source, the divergence of the beam depending on the distance of the lamp from the light shield. Each 2.50

Lamp for Replacement in No. 85331, See No. 84459; Adapter, See No. 84190.

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LIGHT
Mirrors

85380



85385



85390



85395

85334 Mirror and Lens Set, Ray Tracing Apparatus, for use with No. 85330 Apparatus. Consists of a selection of the optical accessories from the set supplied with the Hartl Optical Disk for those who do not have that set of optical disk accessories. The following are included:

- | | |
|-----------------------|------------------------------------|
| 1 Right-angled Prism | 1 Plano-Convex (Semicircular) Lens |
| 1 Erecting Prism | 1 Plane Mirror |
| 1 Double Convex Lens | 1 Concave-Convex Mirror |
| 1 Double Concave Lens | |

As described Per set \$6.75

85380 MIRROR, Plane, glass, 8.5x5.7 cm, lacquered black on one side; useful in studying the laws of reflection, since errors due to refraction are avoided.....Each .10

85385 MIRROR, Plane, glass, 4x15 cm, silvered back Each .08

85390 MIRROR, Plane, glass, 10x10 cm, silvered back Each .08

85395 MIRROR, Plane, thick plate glass, 10x15 cm, silvered back, for double images.....Each .40



85405



85420



85415



CENTRAL SCI. CO.

85425

85405 MIRROR, Spherical, Concave, High Quality, glass, 4 cm in diameter, 25 cm focus, silvered back. Each .65

85407 MIRROR, Spherical, Concave, Demonstration Type, for showing the properties of concave mirrors by means of a mirror of unusual size, for more effective class demonstrations. Consists of a back-silvered, glass concave mirror, 16 inches in diameter, having a focal length of approximately 37 cm.....Each 3.65

85415 MIRROR, Spherical, Convex, High Quality glass, 4 cm in diameter, 25 cm focus, silvered back. Each .65

10% discount in lots of 12

85417 MIRROR, Spherical, Convex, Demonstration Type, for showing the properties of convex mirrors by means of a mirror of unusual size, for more effective class demonstrations. Consists of a back-silvered, glass convex mirror, 16 inches in diameter, having a focal length of approximately 37 cm.....Each 3.00

85420 MIRROR, Spherical, Plane and Concave, Mounted, glass, 5 cm in diameter, 7.5 cm focus silvered backs. Mounted on a metal rod about 18 cm long by 10 mm in diameter. Mirror adjustable about a horizontal axis.....Each 6.00

85425 MIRROR, Spherical, Concave and Convex, glass, 7.5 cm in diameter, 20 cm focus.....Each .35

10% discount in lots of 12